

claims 1 and 2 have been amended. No new matter has been added. Claims 1-2 are pending and under examination.

The title of the application was objected to as not descriptive. The title has been amended in accordance with the Examiner's suggestion to overcome this objection.

The disclosure was objected to on the ground that it is unclear what "OA devices" stands for. The phrase "OA devices" has been replaced by "office automation devices". The new phrase does not constitute new matter because it is clear from a reading of the specification that "OA devices" stands for "office automation devices." The specification clearly states that the present invention is directed to "a motor for use in office automation devices" (see, e.g., the first sentence of the first paragraph of the specification).

The drawings were objected to for not showing the adhesives recited in claims 1 and 2. Figures 2 and 3 and the specification have been amended to add reference numerals for the adhesives.

The Examiner rejected claims 1 and 2 under 35 U.S.C. §112, second paragraph, as being indefinite on the ground that the meaning of the limitation "adhesion" is not clear. Claims 1 and 2 have been amended to replace the word "adhesion" with the phrase "use of an adhesive."

Claims 1 and 2 were rejected under 35 U.S.C. §103(a) as being unpatentable over Obara (U.S. Patent No. 5,841,210) in view of Yoshimura et al. (US Patent No. 5,510,661). According to the Office Action, Obara discloses all but two features of claims 1 and 2. The two features are (1) the knurled grooves

and (2) the relationship between the number of knurled grooves and the number of rolling members. However, according to the Office Action, the first feature is disclosed by Yoshimura et al., and the second feature is obvious to one having ordinary skill in the art. For the reasons set forth hereinafter, it is respectfully submitted that claims 1 and 2 are patentable over Obara in view of Yoshimura et al.

First, it was improper to combine the two references because the motivation to combine the two references in the obviousness rejection was not provided in the Office Action. According to the Office Action, however, the motivation exists to use the knurled grooves of Yoshimura et al. in the motor of Obara, because it is common knowledge to use knurled grooves for the purpose of efficient lubrication.

It is respectfully submitted that the motivation given in the Office Action simply does not exist. First, no evidence was provided in the Office Action to support the assertion that it is commonly known in the art that knurled grooves provide efficient lubrication. In addition, the motor of the present invention does not use a lubricant in most cases, and there is no disclosure or teaching that the motors of Obara and Yoshimura et al. use a lubricant. In fact, miniature motors generally do not use a lubricant. As a result, the knurled grooves cannot improve the lubrication of the motors either in the present invention or in Obara and Yoshimura et al. Accordingly, efficient lubrication is not a motivation to combine the two references.

Second, Applicants respectfully disagree with the assertion that the claimed relationship between the number of knurled grooves and the number of rolling members is obvious to one having ordinary skill in the art. In supporting this assertion, it was alleged in the Office Action that *In re Aller* stands for the proposition that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill. It is respectfully submitted that this reading of the case is wrong. The court in *In re Aller* actually stated that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (emphasis added)" (see MPEP, Section 2144.05, II). In the present invention, the discovery of the claimed relationship between the number of knurled grooves and the number of rolling members involves more than routine experimentation. In fact, it involves an insight that the non-repetitive runout can be prevented by the claimed relationship between the number of knurled grooves and the number of rolling members. This insight is not "routine experimentation."

The MPEP states that an allegation of obviousness can be rebutted by showing that the art teaches away from the claimed invention (see Section 2144.05, III). In this case, Yoshimura et al. teaches that the deformation of a bearing inner race, caused by the curing of an adhesive, can be prevented by keeping the outer diameter of the knurled portion of the shaft within the tolerance of the inner race (column 4, lines 34-41). In the present invention, on the other hand, the deformation is reduced or prevented by the claimed relationship between the number of knurled grooves and the number of rolling

Tolerance
Not teaching
away from
claimed
ratio

Does not
teach away

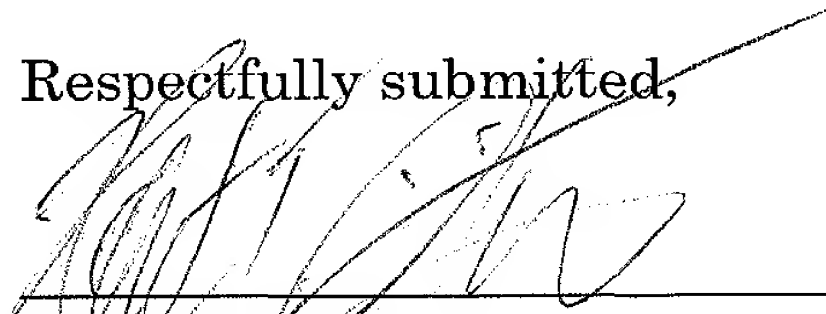
members. Therefore, Yoshimura et al. leads its readers away from the solution provided by the present invention. Accordingly, Yoshimura et al. teaches away from the present invention.

In light of the foregoing remarks, this application is considered to be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #313KA/49958).

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

On Page 1, the second paragraph has been amended as follows:

The motor for the [OA] office automation devices generally comprises a rotor with a magnet fixed to it and a stator with a coil fixed to it. The rotor or stator is provided with a housing, and a rolling bearing is provided between the housing and a shaft.

On Page 1, the third paragraph has been amended as follows:

Conventionally, an adhesive is used to fix the rolling bearing between the shaft and the housing in the [OA] office automation devices. For example, in order that the inner race is fixed to the shaft, a groove is formed around the shaft, and the adhesive is provided between the groove and the inner peripheral surface of the inner race, so that the uniform bonding is made in the circumferential direction.

On Page 7, the second paragraph has been amended as follows:

The number (P) of the knurled grooves 31 is related with the number ($Z = 8$) of the balls (rolling members) 41 of the ball bearing 4 and the relation is given in the equation of $P = 2Z + 2$. Filled in between the knurled grooves 31 and the inner peripheral surface of the inner race 42 is an adhesive 32, for example, an anaerobic adhesive which is hardened to fix the inner race 42 to the shaft 3. The outer race 43 is inserted into and fixed to the sleeve 11 by press-fitting.

On Page 8, the first paragraph has been amended as follows:

Incidentally, in this embodiment, only the outer peripheral surface of the shaft 3 is formed with the knurled grooves 31 satisfying the present invention in number so as to bond the shaft 3 to the inner race 42. In addition to this, the inner peripheral surface of the sleeve 11 may be formed with the knurled grooves 31 satisfying the present invention in number so as to bond the sleeve (housing) 11 to the outer race 43. Or, only the inner peripheral surface of the sleeve 11 may be formed with the knurled grooves 31 satisfying the present invention in number so as to bond the sleeve (housing) 11 to the outer race 43 using an adhesive 44 as shown in Fig. 3. In this case, the shaft 3 is fitted into or bonded to the inner race 42.

IN THE CLAIMS:

Claims 1 and 2 have been amended as follows:

1. (Amended) A motor comprising a rotor, a stator, a shaft, and a rolling bearing, one of the stator and the rotor being provided with a housing, the rolling bearing being provided between the housing and the shaft and having an inner race and outer race, the shaft having an outer peripheral surface, the housing having an inner peripheral surface, the inner race having an inner peripheral surface and the outer race having an outer peripheral surface, the inner race being fixed to the shaft through one of press-fitting and [adhesion] use of an adhesive between the outer peripheral surface of the shaft and the inner peripheral surface of the inner race, the outer race being fixed to the housing through one of press-fitting and [adhesion] use of an adhesive between the outer peripheral surface of the outer race and the inner peripheral surface of the

housing, and at least one of the outer peripheral surface of the shaft and the inner peripheral surface of the housing being formed with knurled grooves, wherein the number (P) of the knurled grooves in the circumferential direction and the number (Z) of the rolling members in the rolling bearing are in the relations of $P \neq nZ$ and $P \neq nZ \pm 1$ where n is a positive integer.

2. (Amended) A motor comprising a rotor, a stator, a shaft, and a rolling bearing, one of the stator and the rotor being provided with a housing, the rolling bearing being provided between the housing and the shaft and having an inner race and outer race, the shaft having an outer peripheral surface, the housing having an inner peripheral surface, the inner race having an inner peripheral surface and the outer race having an outer peripheral surface, the inner race being fixed to the shaft through one of press-fitting and [adhesion] use of an adhesive between the outer peripheral surface of the shaft and the inner peripheral surface of the inner race, the outer race being fixed to the housing through one of press-fitting and [adhesion] use of an adhesive between the outer peripheral surface of the outer race and the inner peripheral surface of the housing, and at least one of the outer peripheral surface of the shaft and the inner peripheral surface of the housing being formed with knurled grooves, wherein the number (P) of the knurled grooves in the circumferential direction and the number (Z) of the rolling members in the rolling bearing are in the relation of $P = nZ \pm X$, where n is a positive integer, and X is 2 or an integer larger than 2.